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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/990,049

11/21/2001

William Ford

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01/23/2006

FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE- 10TH FL.
NEW YORK, NY 10151

EXAMINER

NAFF, DAVID M

ART UNIT

PAPER NUMBER

1651

DATE MAILED: 01/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/990,049

Applicant(s)

FORD ET AL.

Examiner

David M. Naff

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-45 and 47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-45 and 47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

An amendment of 10/14/05 to an office action of 4/14/05 amended claims 25, 26, 29, 33, 35, 37, 38, 40 and 41, and canceled claim 46.

Claims examined on the merits are 25-45 and 47, which are all
5 claims in the application.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

Claims 25-39 and 43-45 are rejected under 35 U.S.C. 112, second
10 paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are confusing and unclear by claim 25 (line 13) being unclear as to the relationship of the "interactive group" to reacting
15 required in line 12. The substance that contains the interactive group and the function of the interactive group during reacting is unclear. In line 13, the portion of the line from "or" to part of "through" has been lined through. Is this intended?

In line 2 of claim 38, "are" should be changed to --- is ---
20 since "nanoparticle of the composite" is recited.

Response to Arguments

Applicants point out that amendments render the 35 U.S.C. 112, second paragraph rejection moot. However, indefiniteness still remains as pointed out above.

Claim Rejections - 35 USC § 103

Claims 25-31, 33-45 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pompe et al (AR) in view of Singh et al (5,560,960) and Richter et al (AQ) for reasons in the previous office
5 action of 4/14/05, and for reasons herein.

The claims are drawn to a process of producing a metal nanoparticle-nucleic composite by reacting a nucleic acid with a metal complex to produce a metal complex-nucleic acid conjugate by metalation of bases and/or binding through an interactive group,
10 removing non-conjugated byproducts, and reacting the conjugate with a reducing agent to produce the metal nanoparticle-nucleic acid composite. The metal nanoparticle of the composite is catalytically active towards electroless metallisation. Also claimed is a metal nanoparticle-nucleic acid composite resulting from the process, a
15 process of making a nanowire by treating the composite by electroless deposition of metal, a nanowire resulting from the process, and a network or electronic circuit containing the nanowire.

Pompe et al disclose (page 1090, left col, second full paragraph) that Pt(II) and Pd(II) complexes such as cis-diamminedichloroplatinum
20 attach to DNA bases to form stable monofunctional and bifunctional adducts. Further disclosed (third full paragraph of the left col) is that the Pt-DNA bond is not broken during reduction, and that Pt(II) and Pd(II) complexes attached to DNA double chain can act as nucleation centers for the growth of metal clusters. Also disclosed
25 is carrying out metallization of DNA by adding DNA to Pd salt solution

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followed by adding a reducing agent, and obtaining clusters on the DNA of 3 to 5 nm in diameter in a few seconds after adding the reducing agent (paragraph bridging the cols, page 1090).

Singh et al disclose (paragraph bridging cols 1 and 2)

5 precipitating nanometer-sized metal particles from solution within vesicles made from polymerizable phospholipids. Polymerized phospholipids are formed and added to a electroless plating solution. Before the electroless plating solution is added, palladium or platinum is provided on the inside surface of vesicles to function as
10 a catalyst (col 3, lines 44-64). To insure that metal particles form only on the inside surface, any metal on the exterior surface of the vesicle is removed such as by using a chelating agent and gel filtering, or by passing the vesicles through an ion exchange column. Singh et al further disclose (col 5, line 18) using cobalt, nickel or
15 iron when producing metal nanoparticles by electroless plating.

Richter et al disclose (page 508 and 510) metallization of DNA similar to Pompe et al and disclose formation of clusters of 1-5 nm diameter on DNA (page 508, left col, third full paragraph).

It would have been obvious to attach cis-diamminedichloroplatinum
20 to DNA as disclosed by Pompe et al, and then use a reducing agent to obtain DNA containing attached platinum metal catalysis for use in electroless deposition of metal on the DNA as suggested by Singh et al subjecting vesicles containing Pd or Pt to electroless metal deposition and as suggested by Pompe et al carrying out metallization
25 of DNA by treating a DNA solution with a Pd salt solution, and then

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adding a reducing agent to form metal clusters on the DNA. Removing any non-attached metal complex from the DNA before electroless metallization would have been obvious to prevent the non-attached metal complex from forming metal particles as suggested by Singh et al

5 removing metal from the exterior of vesicles to prevent metal particles from being formed on the vesicles exterior surface. The objective of Pompe et al is to obtain metal clusters on the DNA and not at other places, and to accomplish this one would obviously have to remove non- attached metal complex before electroless

10 metallization. Removing any non-conjugated by-products would have been obvious simply to prevent any possible inference with subsequent reactions. It would have been apparent from Richter et al that metal clusters of 1-5 nm diameter can be obtained, and it would have been obvious to produce clusters not thicker than DNA since this is an

15 objective of Pompe et al (page 1090, left col, first full paragraph). Reacting DNA with cis-diamminedichloroplatinum as disclosed by Pompe et al followed by reducing as set forth above will inherently result in metallization of bases, and provide a metal nanoparticle active towards electroless metallization. When carrying out metallization of

20 DNA as set forth above, it would have been obvious to form a nanowire since Pompe et al (page 1090, right col, lines 1-10) and Richter et al (paragraph bridging pages 508 and 509) obtain a nanowire. Using the nanowire in an electronic circuit would have been obvious since metal wires are conventionally used in such circuits. The metallization of

25 Pompe et al and Richter et al is controlled since they disclose

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controlling the time of metallization to control the size of clusters. The use of cobalt, nickel or iron when producing metal nanoparticles by electroless plating as disclosed by Singh et al would have suggested using a electroless plating solution as in claim 38.

Response to Arguments

Applicants urge that the combination of references do not suggest the feature of claim 25 that recites "wherein the metal complex-nucleic acid conjugate is formed by the specific reacting of the nucleic acid specific metal complex with bases of the nucleic acid".

However, in Pompe et al and Richter et al, reacting a metal complex with DNA, inherently results in the metal complex reacting with bases of the nucleic acid.

Claim Rejections - 35 USC § 103

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 25-31, 33-45 and 47 above, and further in view of Newsman et al (5,670,680) for reasons in the previous office action, and for reasons herein.

The claim requires a gaseous reducing agent.

Singh et al disclose using hydrogenation (col 4, line 57) for reducing metal ions to produce metals in a process of producing metal nanoparticles by electroless plating.

Newman et al disclose using hydrogen gas for hydrogenation in producing metal complexes.

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It would have been obvious to use hydrogen gas as a reducing agent to reduce the metal of a conjugate of a metal complex and DNA disclosed by Pompe et al as suggested by Singh et al and Newman et al.

Response to Amendment

5 This rejection has not been separately traversed, other than rely on arguments presented in response to the rejection above.

Double Patenting

Claims 25-45 and 47 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as
10 being unpatentable over claims 1-4, 6-22 and 25-35 of copending Application No. 10/210,812 in view of Singh et al.

The claims of the copending application require metallization of a nucleic acid to produce a metal nanoparticle-nucleic acid composite.

It would have been obvious in view of Singh et al for the type of
15 reasons set forth above to remove non-conjugated metal complexes and/or non-conjugated by-products, if formed, before treatment with a reducing agent in the process of the copending application claims for metallization of DNA. The presence of extraneous metal complex or
other by-products will obviously be a contaminant that can interfere
20 with subsequent reactions.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

Applicants' urge that the copending application claims do not
25 remove non-conjugated metal complex, and there is not motivation in

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the '812 application claims to combine its teachings with Singh et al. However, the claims recite "removing any", which requires removing non-conjugated metal complexes and/or non-conjugated products only if formed. The claims do not require the non-conjugated complexes or products to be formed. Furthermore, removal of non-conjugated metal complex that is not at a desired site for depositing metal is suggested by Singh et al, and the reason for removing extraneous metal complex provided by Singh et al is motivation.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

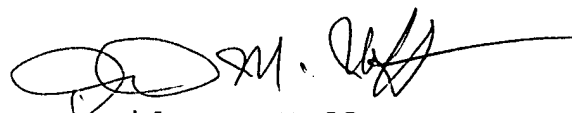
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David M. Naff

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whose telephone number is 571-272-0920. The examiner can normally be reached on Monday-Friday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn can be reached on 571-272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David M. Naff
Primary Examiner
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